

REMARKS

Claim 13 and 18-25 are currently pending in this application. By this response to the non-final Office Action mailed on March 17, 2009, claim 13 is amended, and new dependent claims 18-25 are added. Support for the amendments is found, for example, at page 10, line 20 to page 11, line 7; page 19, line 13 to page 20, line 17; page 21, lines 9-12; and FIGS. 10A, 10B, 11A, 11B, 12B, and 16 of the application as originally filed. No new matter has been introduced. Favorable reconsideration of the application in light of the foregoing amendments and following comments is respectfully solicited.

In section 5 of the Office Action, claim 13 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,933,219 (Unno) in view of U.S. Patent No. 6,685,848 (Sasaki). Applicant respectfully traverses.

Claim 13 recites, *inter alia*,

employing linearly polarized light to transfer on a resist film formed on a wafer a mask pattern formed on a mask;

...

to form said pattern said mask pattern has an opening larger in width in a first direction parallel to said linearly polarized light's direction of polarization than a second direction orthogonal to said first direction, and

said pattern is substantially the same width in said first and said second directions.

Embodiments of the above limitations prevent abnormal transfer of a sub peak from serving as an obstacle to exposure with improved resolution, and also prevent a pattern from not having a geometry with substantially the same width in the first and second directions. That is, the pattern is formed on the wafer with substantially the same width in the first and second directions. For example, a rectangular geometry pattern is formed on the mask so as to obtain a pattern formed on the wafer substantially the same width in the first and second directions. In contrast, the above limitations are not disclosed nor suggested in any of the cited references.

Unno discloses changing the direction of polarization for a linearly polarized exposure beam such that the direction of polarization corresponds to the longitudinal direction of a feature included in a region being exposed. For example, for the mask shown in FIG. 2 of Unno, regions A and C are exposed with light linearly polarized in the y-direction to correspond with the longitudinal direction of features 21 and 25, whereas region B is exposed with light linearly polarized in the x-direction to correspond with the direction of feature 23. Unno, col. 5, lines 25-50.

However, Unno does not disclose or render obvious that “to form [a] pattern said mask pattern has an opening larger in width in a first direction parallel to said linearly polarized light's direction of polarization than a second direction orthogonal to said first direction, [wherein] said pattern is substantially the same width in said first and said second directions.” In Unno, the mask pattern is formed as a precondition, and a direction of polarization used to expose a mask region is selected that best accommodates the orientation of a mask pattern feature within the region. There is no disclosure or suggestion in FIG. 2 (displaying a mask pattern) or the specification of Unno of forming a “pattern which is substantially the same width in said first and said second directions” by use of a “mask pattern [which] has an opening larger in width in a first direction parallel to said linearly polarized light's direction of polarization than a second direction orthogonal to said first direction,” as recited in claim 13.

Sasaki does not bridge the above gaps between claim 13 and Unno. Sasaki identified a problem occurring in dry-etching a metal thin film or chromium-containing half-tone photomask, in which densely patterned regions experience a higher etching rate, resulting in unwanted dimensional differences in the etched photomask. Sasaki, col. 2, line 66 to col. 3, line 11. To solve this, Sasaki discloses using a mixed etching gas comprising an oxygen-containing halogen gas to which a hydrogen-containing gas is added, that decreases the dimensional difference observed between photomask features in dense portions (with a large removed area) versus coarse

portions (with a small removed area) in comparison to conventional dry etching techniques. *See* Sasaki, col. 15, lines 39-42; Table 3. Sasaki does not discuss the use of a linearly polarized exposure light. This is not particularly relevant to the claimed subject matter, and does not bridge the gap between claim 13 and Unno. Even if, as suggested on page 3 of the Office Action, Sasaki's mask-production technique were employed in Unno to "achieve very small dimensional difference between the coarse and dense portions" of the mask used in Unno, this would merely provide a mask more accurately reflecting the intended mask design. However, as discussed above, Unno does not even contemplate a mask design corresponding to the claimed subject matter. The techniques disclosed by Sasaki for etching a photomask do not cure this shortcoming.

For at least the above reasons, the cited art does not render obvious the claimed subject matter. Thus, Applicant respectfully requests withdrawal of the rejection of claim 13. Further, Applicant respectfully requests allowance of new claims 18-25, which each depend upon claim 13.

In view of the above remarks, Applicant respectfully submits that the application is in condition for allowance, and respectfully requests the Examiner's favorable reconsideration as to allowance. The Examiner is invited to contact the Applicant's representative listed below.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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